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Entrustable professional activities (EPAs) for postgraduate competency based intensive care medicine training in the Netherlands: The next step towards excellence in intensive care medicine training

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ABSTRACT

Introduction: The Competency Based Training in Intensive Care Education (CoBaTrICE) programme developed common standards of ICM training by describing competencies of an intensivist. Entrustable Professional Activities (EPAs) of Intensive Care Medicine (ICM) (EPAsICM) are presented as a new workplace-based assessment tool in competency-based training of intensivists. EPAs are activities to be entrusted to a trainee once he (or she) has attained competence. EPAs emphasise the role of trust between trainees and supervisors. EPAs bridge the gap between competencies and competence.
Methods: An expert panel of ICM (vice)programme directors and intensivists in The Netherlands integrated the CoBaTrICE and CanMEDS competencies into EPAsICM. Comment and feedback was sought from other ICM programme directors and educational experts and processed in the final version of EPAsICM before implementation in the Dutch ICM training programme.
Results: A list of 15 EPAsICM are considered to reflect the spectrum of clinical practice while incorporating the competencies of CoBaTrICE and CanMEDS. The grading system is designed as a 5-point entrustment scale based on the amount of supervision a trainee needs, aligning with daily judgement of trainees by intensivists.
Conclusion: EPAsICM is an assessment tool that formalises entrustment decisions and can be a valuable addition in international ICM training.

1. Introduction

In 2006 a collaboration of national Intensive Care Medicine (ICM) training organisations introduced the Competency Based Training programme in ICM in Europe (CoBaTrICE) [1,2]. CoBaTrICE is now the common international standard of ICM training in most countries in Europe and has provided trainers and trainees with a valuable list of core competencies: the knowledge, skills and attitudes that every contemporary intensivist should be able to apply in practice [3]. However, assessment of the separate competencies does not accurately represent overall competence.

The ultimate goal of ICM training is achieving clinical competence, meaning readiness for independent, unsupervised practice. The mainstay of deciding whether a trainee can act with less or without supervision is trust. Entrustment decisions play a central role in daily interactions between supervisors and trainees and are often made ad hoc. Based on this concept, ten Cate et al. developed a framework for formalising these entrustment decisions: 'Entrustable professional activities' (EPAs). EPAs are activities to be entrusted to a trainee once he (or she) has attained sufficient competence. [4–7]. EPAs describe the actual work performed in clinical practice and thereby combine separate competencies into integrated tasks which are recognisable units of work in a particular clinical context. For example, an EPA "septic patient" reflects competence of management of a septic patient as a whole, instead of several separate assessments of skills, knowledge and attitude such as safe placement a central venous line, a differential diagnosis of sepsis, promotion of teamwork.

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EPAs emphasise the role of trust between trainees and supervisors: the grading system of an EPA is based on the level of supervision needed to safely carry out a clinical task [5,8].

EPAs are increasingly used for assessment in both graduate and postgraduate programmes worldwide [9-11]. The aim of this article is to present EPAsICM as a new assessment tool in ICM training.

2. Development of EPAs for ICM training (EPAsICM)

In this section we first explain the Dutch ICM training programme. Secondly, we describe the development of EPAsICM in the Netherlands. Finally, we present the outcome of this process.

2.1. The ICM training programme in the Netherlands

ICM training in the Netherlands is a multidisciplinary access supraspecialty model and encompasses two years in total. The Netherlands have used competence based training for all medical specialist training programmes since 2008 and have subsequently incorporated the CoBaTrICE in the Dutch ICM training programme in 2011 as one of the early adapters [12,13]. In 2014 the Dutch National Federation of Medical Specialists started a national project on the individualisation of training duration of all medical speciality training programmes including the introduction of EPAs [14].

The CoBaTrICE based national ICM training programme is governed by the Dutch Joint Intensivists Committee (GIC). To ensure high quality level of ICM education the GIC harmonises teaching and assessment in the eight Dutch ICM teaching institutes (see supplements logbook).

An electronic educational portfolio (Electronic Portfolio and Assessment Support System, EPASS) (www.epass.eu) is used by trainees (ICM fellows) and trainers to support reflection and progression on the process of learning.

2.2. Development of EPAsICM

An expert panel was appointed on behalf of the GIC to compose EPAs for the Dutch ICM training programme in May 2015.The panel included ICM (vice) programme directors and other intensivists with extensive educational and ICM expertise.(JT, RT, SA, THR, WvM, MM, HD, EvB). The panel had in person meetings every 3 months and collaborated in shared documents online.

The panel supported the notion that an EPA had to reflect day to day practice and had to be observable, measurable, executable within a given timeframe and be suitable for solid entrustment decisions [4-7]. In addition, the number of EPAsICM had to be manageable and, at the same time, broadly cover our profession. After several meetings of the expert panel and discussions in the GIC, consensus was reached on a list of 15 frequently encountered clinical problems in the ICM setting (Table 1)(see also supplement document logbook part B).

Preliminary versions of these 15 EPAsICM were developed by the participants of the panel and further adapted during the meetings.

We constructed an EPAsICM template based on the original EPA template by ten Cate et al. [4-7]. Table 2 (a,b,c) shows EPA 3 (sepsis) and is an illustration of the template of EPAsICM. This template is applied to all 15 clinical problems (supplement fig. 2). The content of EPAsICM was expert validated by other intensivists and specialists in the training hospitals and adapted if necessary. During the development of the template we also consulted several educational experts (acknowledgements). They underscored our emphasis on trust ("start the template with this question") and warned that a Knowledge, skills and attitude (KSA) list could be seen as a new checklist and suggested to change the heading of this column to 'aspects to improve" to prevent "ticking all these boxes". Additional feedback was sought from more than 50 medical educators (joining workshops on this topic, organised by the authors) at the yearly congress of the Dutch Society of Medical Education (NVMO) 2016 and 2017. At the workshop of the NVMO 2016 several questions were addressed concerning the ideal template of an EPA ("emphasis on trust", "competencies should not be addressed separately"), how the entrustment decision should take place ("trainee should be in the lead") and how to gain support ("EPA should be representative and relevant"). The round table meeting in 2017 led to a lively discussion on the mode of implementation, the use of EPAs in practice and possible ideas for future research. One recurring theme was the perceived importance of trust not only in the trainee but also in the judgement of another supervisor. Furthermore, the concept and the EPAsICM under construction were presented and discussed with the CoBaTrICE faculty and forum during the ESICM meeting 2016 (chair HU Rothen), in the presence of 10–15 European representatives in ICM. Although EPAsICM was a new concept for most attendees, reactions were positive, mainly because the alignment with daily clinical practice and attendees considered that this was "how CoBaTrICE was meant to be". The concept clearly resonated with the audience. (supplements logbook making of EPAsICM).

Subsequently, the eight Dutch ICM training hospitals tested the applicability of three EPAsICM in daily training from January to April 2017. With the obtained comments, the EPAsICM were further adapted. All 15 EPAsICM were gradually introduced in the training hospitals since April 2017. We aim to assess the practical applicability, usefulness and acceptance as well as the impact on the training process of the ICM fellows in the first half of 2019. Thereafter, the PDCA (plan-do-check-act) cycle will be used to facilitate the process of continuous quality control and improvement regarding the EPAsICM.

For a more detailed description of the development process we would like to refer to the logbook document in the supplements (supplements logbook making of EPA).

Table 1
List of 15 EPAsICM.

EPA ICM	
1	Postoperative management care of surgical patient
2	Consultation and triage of potential ICM patient
3	Patient with sepsis
4	Patient with acute abdominal condition
5	Patient with cardiogenic shock and/or cardiovascular disorders
6	Patient with massive bleeding
7	Patient with complex ventilation and oxygenation problems
8	Patient with altered consciousness
9	Patient with acute (on chronic) liver failure
10	Trauma patient
11	Patient with acute brain condition (ischemia and intracranial bleeding)
12	Patient with renal failure
13	Immunocompromised patient
14	Patient with metabolic disturbance
15	Long stay ICM patient

EPAsICM = Entrustable Professional Activity for Intensive Care Medicine.

2.3. Outcome

The outcome of the developmental process was a list of 15 clinical problems described in 15 EPAsICM (Table 1). The 15 EPAsICM combined represent an overall integration of CoBaTrICE and CanMEDS competencies and therefore broadly reflect the core of the clinical profession of ICM. The incorporation of CanMEDS in each EPA is shown in Fig. 1. A separate table shows a broad coverage of the competencies of CoBaTrICE (Supplement table 3 and 4).

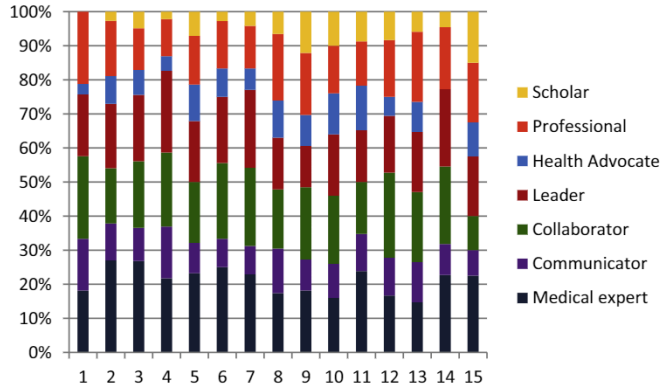

Fig. 1. CanMEDS representation in the EPAsICM. x-values: EPAsICM 1 to 15, y-values: percentage of CanMEDs competencies per EPA ICM. Legend: CanMEDs competencies.

Each EPAICM consists of three parts. The first part, Table 2a, is the actual description of the EPAICM. The second part, Table 2b, consists of a referral to the competencies of the CoBaTrICE list, requirements to pass the EPA and suggestions to enhance progress. The third part, Table 2c, is the legend of the CanMEDS competencies and of the supervision levels.

To emphasise the role of entrustment, the first part of each EPAICM starts by asking the supervisor which amount of supervision the trainee needs to safely handle the specific clinical problem on a scale of I (supervisor at bedside) to V (trainee can provide supervision to junior doctor). The five levels of supervision are adapted to the ICM environment and workflow (Table 2c). as a balance between reliability and validity on the one hand and practical applicability and acceptance on the other. In order to obtain 3 judgements on the desired level a trainee will mostly have to be assessed more than 3 times as in the process of growth lower levels will be granted in the beginning of training. Our trainees, ICMfellows, should minimally acquire level III after one year and level IV at the end of training on all EPAsICM.

The first part of the EPAICM (Table 2a) continues with a list of Knowledge, Skills and Attitudes (KSA) meant to cover the competencies needed for the specific clinical problem. The list shows integration of the CoBaTrICE competencies with CanMEDS roles of medical expert, communicator, collaborator, health advocate, leader, scholar, and professional (M, C, Co, HA, L, S and P). It can be used to show the trainee which aspects need more attention. This list is *not* meant to tick boxes, but merely serves as a reminder for the supervisor to support and motivate the entrustment decision and as a guide to the ICMfellow in his training process. Instead of assessing all competencies in this KSA list separately, supervisors can adopt a position of trust, an integrative holistic approach to competencies and thus give a judgement as a whole concerning the level of supervision a trainee needs for an EPAICM. A supervisor may infer that a trainee possesses the required competencies in an EPAICM if the trainee performs a given task in a manner sufficient to be entrusted to fulfil that task without direct supervision. Aspects of trust are trustworthiness, knowing one's limits (discernment), communicating honestly (truthfulness), and fulfilling one's commitment (conscientiousness). Specific attention is given to these aspects in the KSA list of each of the EPAsICM.

Apart from the content aspects of EPAsICM, it should be acknowledged that EPAsICM are not time-consuming: When a supervising intensivist is confronted with an EPAICM by an ICMfellow, the supervisor only has to make an entrustment decision concerning the level of supervision needed and to sign the from. If applicable the supervisor can mark aspects to improve in the KSA list or add narrative feedback.

3. Discussion

EPAsICM is new and promising framework for assessing competence of ICM trainees. Competencies are judged as they occur in daily practice, namely integrated around a clinical problem that is relevant to the profession of intensive care specialist. EPAs resonate with clinicians since the EPAs are more recognisable, observable and integrated into clinical situations than the underlying competencies.

Fessler et al. suggested a possible list of EPAs in ICM training in the United States in 2014 [15]. Our article is, to the best of our knowledge, the first publication reporting detailed descriptions of EPAs for ICM training (EPAsICM).

Until now we lacked an assessment tool of *overall clinical competence* in the competency based ICM training programme [16-19]. The current workplace based assessment (WBA) tools in ICM training, such as "Clinical Evaluation Exercise" (MiniCEX) and "Objective Structured Assessment of Technical Skills" (OSATS),are primarily feedback instruments meant for instruction and guidance of the trainee in his learning process [16-19]. They are often misused as summative assessment tools, and-as pointed out by others- "combining the roles of 'helper' and 'judge' confronts supervisors with a conflict of interest and this can lead to inflation of judgement and trivialisation of the assessment process" [20].

Furthermore, current WBA tools focus on isolated competencies, for example making a differential diagnosis of acute kidney failure or placing a central venous line. Assessing separate competencies does not mean competence as a whole, i.e. readiness for independent, unsupervised practice.

An assessment tool that assesses overall competence is important for trainees, programme directors, faculty members as well as for the public domain: First, for trainees it may encourage active learning and setting goals and preferences over time. Second, it may support programme directors in their responsibility to identify areas of improvement, encourage the individual learning progress and formally assess their fellows. Third, for faculty members an holistic approach on performance in daily ICM practice rather than a focus on separate competencies, motivates them to be engaged in the training programme [21]. Last but not least, an objective assessment framework is transparent to the public domain to which we have a responsibility to deliver trustworthy health professionals.

The Dutch ICM training programme has developed a manageable set of the 15 important clinical problems of ICM in the form of EPAsICM to assess overall clinical competence as an intensivist, using the competencies described in by CoBaTrICE combined with the generic skills of the CanMEDS framework. The outcome of each EPAICM is described in terms of the level of supervision needed, aligning with the way supervisors already make day-to-day decisions that are mainly based on trust. With EPAs, supervisors use their expert judgement to formally document entrustment decisions.

We think the integration of competencies enables to judge more efficiently whether a trainee is capable of dealing with a specific clinical problem and is more in alignment with daily practice. It is perceived to be more user friendly to trainees and supervisors as well: Many checklists are experienced as laborious and time consuming chores. By aligning judgement with daily practice (tasks as well as the of level supervision needed) this is considered to be less the case [17].

EPAsICM are not meant to replace assessment of individual competencies: With usage of EPAs, competencies are judged related to clinical problems as they occur in daily practice, namely integrated not separated. EPAs formalise the daily ad hoc judging or 'gut-feeling' process, namely deciding with each clinical task how much supervision we are going to give to a trainee.

Table 2a
First part of EPA ICM template- EPA 3 sepsis.

EPA 03	**Management of patient with sepsis**	**Level of Supervision**				
Entrustment decision		**I**	**II**	**III**	**IV**	**V**
Main focus	**Differential diagnosis, hemodynamic, ventilator and renal support, appropriate skills, antimicrobial therapy**					
Checklist to help entrustment decision: Knowledge, Skills, Attitude (CanMEDS competency field)						Aspects to improve
Knows current sepsis guidelines (M, S)						
Obtains history and performs appropriate physical examination (M, C)						
Differentiates septic shock from other types of shock (M)						
Organises timely and appropriate diagnostics and interprets results to form a differential diagnosis (S,M, L)						
Initiates and manages adequate antimicrobial drug therapy and source control (M, HA)						
Knows and applies therapeutic interventions/circulatory support: fluids and vasoactive/inotropic drugs (M, L)						
Performs central venous catheterisation (M, Co, L)						
Performs airway management (M, Co, L)						
Initiates and manages respiratory support (M, Co, L)						
Recognises indications of renal replacement therapy (M) (see also EPA 12 Renal Failure)						
Responds adequately to trends in physiological variables (M, Co, L)						
Communicates effectively with health care team and other medical specialties and promotes teamwork (C, Co, L, P)						
Communicates effectively with patient and/or surrogates about decisions of care, treatment and consequences for prognosis (C, HA, P)						
Manages end of life care and the process of withholding treatment with the multidisciplinary team (C, Co, L, HA, P)						
Takes responsibility for patient safety and asks for help timely (Co, P)						
Attends to medical file and communicates continuing care requirements at ICU discharge (Co, L, P)						
Extra Feedback						
Fellow						
Supervisor						
Date						

Table 2b
Second part of EPA ICM template- EPA 3 sepsis.

EPA 03	**Management of patient with sepsis**
CoBaTrICE competencies	1.1, 1.4, 2.1-2, 2.5-10, 3.1-4, 3.9, 4.1-2, 4.4, 4.7-9, 5.1, 5.3, 5.8-5.10, 5.12-13, 5.17-19, 5.217.1-7.5, 8.1-3, 10.1, 11.1-4, 11.6-8, 12.1-8, 12.10-12.13
Requirements	Training in central venous access Training in airway management Entrustment decisions on desired level by minimal 3 different supervisors Case based discussion
Suggestions to enhance progress	MiniCEX on parts of EPA OSATS for skills Literature, eLearning Case based discussions

Table 2c
Third part of EPA ICM template- EPA 3 sepsis.

Background information			
CanMEDS Competency fields	M C Co L HA P S	Medical expert Communicator Collaborator Leader Health Advocate Professional Scholar	
Levels of Educational Supervision * Fellow remains under final responsibility of supervisor.	I	Direct supervision	Supervisor is present at bedside. Part of this level can include coactivity; activity is done collaboratively with supervisor.
	II	Proactive supervision	Fellow may carry out full activity while supervisor is on the ward. Supervisor can intervene at any time deemed necessary. Supervisor checks *all* findings.
	III	Responsive supervision	Fellow may carry out full activity independently with supervisor not present in the room but available within minutes. Including availability of supervision by telephone for advice. Supervisor checks *key* findings.
	IV	Postponed supervision	Fellow may carry out full activity with deferred consultation of supervisor. Fellow reports post hoc. This stage gradually extends into unsupervised practice and marks grounded trust that should allow for certification to take full responsibility for an entrustable professional activity.*
	V	Provide supervision (Subject to judgement of programme director)	Fellow shows ability to provide supervision and may act in a supervisory role for more junior trainees.*

EPAsICM can be additional to written exams (to assess knowledge) and assessment several practical skills (e.g. airway management, venous access).

The proposed EPAsICM have to prove validity and reliability in practice. To be *valid*, a tool has to measure what we really want to know and represent the construct that is being studied. Therefore, assessment of the trainee has to reflect the expertise of the clinician [17,22]. EPAsICM assess if an ICMfellow can be entrusted managing ICM clinical problems.

Reliability of an assessment tool can be subject to interrater variability. This might not be due to supervisors disagreeing on trainee performance, but to different interpretations of the assessment scale [17,23]. It is known that both precisely described assessment scales and alignment with clinical practice enhances interrater reliability of WBA [17,18,22-25]. EPAsICM have an elaborately described 5 point assessment scale that resonates with ad hoc entrustment decisions in daily practice. EPAsICM are based on expert judgements to weigh ICMfellows performance in the complex setting of clinical practice. Compared to most objectified and standardised methods, expert judgement requires smaller samples [20,23,26].

EPAs interrater variability has not yet been studied. With the arguments above and for practical purposes we have started out with at least 3 separate supervisors to independently judge that a trainee is on a certain supervision level.

The first studies concerning validity and reliability of EPAs for medical specialist training in Paediatrics, Surgery and Internal Medicine have been published last year en show encouraging results [9-11] Although promising and despite supportive data from other medical specialty contexts, EPAsICM will need to be further studied in the coming years to determine if EPAsICM are reliable and valid in ICM training.

In addition to reliability and validity, acceptability and feasibility of EPAsICM require attention. We think that alignment with clinical practice, the limitation of the number of EPAsICM and the little amount of time needed to make an expert judgement will help to meet these requirements.

For acceptability and feasibility there are a several other aspects to consider. First, thorough and ongoing faculty development are key for a successful implementation [18,19,27,28]. Secondly, to keep trainees and supervisors engaged, it is important that documentation of the assessment data is user friendly. Currently, we are considering a handheld application for EPAsICM. Thirdly, differences between institutions may exist; it is interesting to see what requirements are needed for appropriate exposure and acquisition of each EPAICM. Furthermore, in cases of trainee exchange, interinstitutional agreement on the use and value of EPAsICM is mandatory. Finally, a different mode of weighing performance of fellows will affect our role of clinicians in guidance and providing feedback. Based on experiences in other training programmes with implementation of EPAs, we want to emphasise that that one should not rush formal `pass/fail` decisions with this new assessment tool. Instead, time should be taken to experience the impact, boundaries and possibilities with EPAs in one's own curriculum to come to a solid implementation [9,28].

The European Union of Medical Specialists (UEMS) recommends a common international training framework. The CoBaTrICE programme took the first step to harmonise ICM training programmes, independently of the primary speciality [3]. EPAsICM have recently been introduced in the Netherlands. Based on CoBaTrICE, EPAsICM can hopefully be a valuable addition as a useful assessment tool in international competency based ICM training.

More experience with and further studies of EPAsICM will be needed to learn more about content validity, interrater variability, acceptability, feasibility and generalisability across other countries.

4. Conclusion

EPAsICM of the Dutch ICM training programme as a new tool for assessing competence of trainees of ICM are presented. 15 EPAsICM cover and integrate CoBaTrICE and CanMEDS competencies into relevant clinical contexts and represent the final products of the ICM

training programme. Assessment with EPAsICM is based on the level of supervision needed, aligning with the way supervisors already make day-to-day decisions that are mainly based on trust. In our opinion EPAsICM could be a valuable addition in international competency based ICM training programmes.

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Consent for publication

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Availability of data and material

Data sharing not applicable to this article as no datasets were generated or analysed during the current study.

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Authors' contributions

EB initiated the study, participated in the design and coordination and drafted the manuscript, PW helped to draft the manuscript, WM participated in the design and helped to draft the manuscript, MA participated in the design and helped to draft the manuscript, RT participated in the design and helped to draft the manuscript, TH participated in the design and helped to draft the manuscript, MM participated in the design and helped to draft the manuscript, HD participated in the design, JT initiated the study, participated in the design and coordination and helped to draft the manuscript. All authors read and approved the final manuscript.

Declaration of Competing Interest

"The authors declare that they have no competing interests."

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Appendix A. Supplementary data

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References

[1] CoBaTrICE Collaboration. The educational environment for training in intensive care medicine: structures, processes, outcomes and challenges in the European region. Intensive Care Med 2009;35:1575–83. https://doi.org/10.1007/s00134-009-1514-4.
[2] CoBaTrICE Collaboration, Bion JF, Barrett H. Development of core competencies for an international training programme in intensive care medicine. Intensive Care Med 2006;32:1371–83. https://doi.org/10.1007/s00134-006-0215-5.
[3] Bion J, Rothen HU. Models for intensive care training. A European perspective. Am J Respir Crit Care Med 2014;189:256–62. https://doi.org/10.1164/rccm.201311-2058CP.
[4] ten Cate O. Entrustability of professional activities and competency-based training. Med Educ 2005;39:1176–7.
[5] Ten Cate O. Nuts and bolts of entrustable professional activities. J Grad Med Educ 2013;5:157–8. https://doi.org/10.4300/JGME-D-12-00380.1.
[6] ten Cate O, Scheele F. Competency-based postgraduate training: can we bridge the gap between theory and clinical practice. Acad Med J Assoc Am Med Coll 2007;82:542–7. https://doi.org/10.1097/ACM.0b013e31805559c7.
[7] Ten Cate O, Chen HC, Hoff RG, Peters H, Bok H, van der Schaaf M. Curriculum development for the workplace using Entrustable Professional Activities (EPAs): AMEE guide no. 99. Med Teach 2015;37:983–1002. https://doi.org/10.3109/0142159X.2015.1060308.
[8] Choo KJ, Arora VM, Barach P, Johnson JK, Farnan JM. How do supervising physicians decide to entrust residents with unsupervised tasks? A qualitative analysis. J Hosp Med 2014;9:169–75. https://doi.org/10.1002/jhm.2150.
[9] Wagner JP, Lewis CE, Tillou A, Agopian VG, Quach C, Donahue TR, et al. Use of Entrustable professional activities in the assessment of surgical resident competency. JAMA Surg 2018;153(4):335–43.
[10] Mink RB, Schwartz A, Herman BE, Turner DA, Curran ML, Myers A, et al. Validity of level of supervision scales for assessing pediatric fellows on the common pediatric subspecialty Entrustable professional activities. Acad Med J Assoc Am Med Coll 2018;93:283–91. https://doi.org/10.1097/ACM.0000000000001820.
[11] Schmelter V, März E, Adolf C, Wölfel TL, Lottspeich C, Fischer MR, et al. Ward rounds in internal medicine: Validation of an Entrustable Professional Activity (EPA) observation checklist. GMS J Med Educ 2018;352. https://doi.org/10.3205/zma001164 Doc17.
[12] Tulleken JE. Intensive care medicine curricula in Europe. Intensive Care Med 2015;41:2241. https://doi.org/10.1007/s00134-015-3997-5.
[13] Scheele F, Teunissen P, Luijk SV, Heineman E, Fluit L, Mulder H, et al. Introducing competency-based postgraduate medical education in the Netherlands. Med Teach 2008;30:248–53. https://doi.org/10.1080/01421590801993022.
[14] Bolk M, Dijkstra A, van der Horst M. Individualising postgraduate medical training using Entrustable professional activities and summative entrustment decisions. https://www.medischevervolgopleidingen.nl/sites/default/files/flyer_amee_2017_online.pdf.
[15] Fessler HE, Addrizzo-Harris D, Beck JM, Buckley JD, Pastores SM, Piquette CA, et al. Entrustable professional activities and curricular milestones for fellowship training in pulmonary and critical care medicine: report of a multisociety working group. Chest 2014;146:813–34.
[16] van Mook WNKA, Bion J, van der Vleuten CPM, Schuwirth LWT. Integrating education, training and assessment: competency-based intensive care medicine training. Neth J Crit Care 2011;15:192–8.
[17] Rekman J, Gofton W, Dudek N, Gofton T, Hamstra SJ. Entrustability scales: outlining their usefulness for competency-based clinical assessment. Acad Med J Assoc Am Med Coll 2016;91:186–90. https://doi.org/10.1097/ACM.0000000000001045.
[18] Kogan JR, Holmboe ES, Hauer KE. Tools for direct observation and assessment of clinical skills of medical trainees: a systematic review. JAMA 2009;302:1316–26. https://doi.org/10.1001/jama.
[19] Govaerts MJ, Van der Vleuten CP, Schuwirth LW, Muijtjens AM. Broadening perspectives on clinical performance assessment: rethinking the nature of in-training assessment. Adv Health Sci Educ 2007;12:239–60.
[20] van der Vleuten CP, Schuwirth LW, Driessen EW, Dijkstra J, Tigelaar D, Baartman LK, et al. A model for programmatic assessment fit for purpose. Med Teach 2012;34:205–14. https://doi.org/10.3109/0142159X.2012.652239.
[21] Driessen E, Scheele F. What is wrong with assessment in postgraduate training? Lessons from clinical practice and educational research. Med Teach 2013;35:569–74. https://doi.org/10.3109/0142159X.2013.798403.
[22] Crossley J, Jolly B. Making sense of work-based assessment: ask the right questions, in the right way, about the right things, of the right people. Med Educ 2012;46:28–37.
[23] Crossley J, Johnson G, Booth J, Wade W. Good questions, good answers: construct alignment improves the performance of workplace-based assessment scales. Med Educ 2011;45:560–9. https://doi.org/10.1111/j.1365-2923.2010.03913.x.
[24] George BC, Teitelbaum EN, Meyerson SL, Schuller MC, DaRosa DA, Petrusa ER, et al. Reliability, validity, and feasibility of the Zwisch scale for the assessment of intraoperative performance. J Surg Educ 2014;71:e90–6.
[25] Weller J, Castanelli D, Chen Y, Jolly B. Making robust assessments of specialist trainees' workplace performance. BJA Br J Anaesth 2017;118:207–14.

[26] Sklar DP. Competencies, milestones, and entrustable professional activities: what they are, what they could be. Acad Med J Assoc Am Med Coll 2015;90:395–7. https://doi.org/10.1097/ACM.0000000000000659.
[27] Dudek NL, Marks MB, Regehr G. Failure to fail: the perspectives of clinical supervisors. Acad Med J Assoc Am Med Coll 2005;80:S84–7.
[28] Lomis K, Amiel JM, Ryan MS, Esposito K, Green M, Stagnaro-Green A, et al. Implementing an Entrustable professional activities framework in undergraduate medical education: early lessons from the AAMC Core Entrustable professional activities for entering residency pilot. Acad Med J Assoc Am Med Coll 2017;92:765–70. https://doi.org/10.1097/ACM.0000000000001543.